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Polytetrafluoroethylene with improved creep resistance, and preparation thereof

Description of Technology: This invention relates to polytetrafluoroethylene (PTFE) and particularly to shaped compositions of PTFE having substantially improved resistance to cold flow deformation under load (creep) and a novel process for their fabrication.

Patent Listing:

1. **US Patent No. 5,420,191,** Issued on May 30,1995, "Polytetrafluoroethylene with improved creep resistance, and preparation thereof."

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=5,420,191.PN.&OS=PN/5,420,191&RS=PN/5,420,191

Market Potential: The surprising discovery of the present invention is that shaped articles fabricated by the process of this invention are substantially superior in creep resistance to conventionally fabricated PTFE articles. PTFE articles subjected to maximum temperatures in the temperature range of about 330.degree. to about 338.degree. C. exhibit two distinct PTFE crystalline melting points (at about 342.degree. and 327.degree. C.), characteristic of the presence of both extended chain and folded chain crystalline morphology.

In a preferred embodiment of this invention, virgin resin powder or blend thereof with a polyfluorinated substance, is placed in a mold which in turn is placed between the heated platens of a hydraulic press, and simultaneously heated and compressed. This technique, known as "hot compression molding" (HCM), is in common use for molding thermoplastics other than PTFE homopolymer. However, with the possible exception of the Hungarian reference cited above, applicants are unaware of HCM being used hitherto to fabricate PTFE, and its use in the present invention has provided shaped articles that are surprisingly creep resistant. Conventionally fabricated PTFE is fabricated from PTFE that is characterized by a melting point of about 327.degree. C. and a heat of fusion not exceeding about 30 Joules/gram (J/g). The heat of fusion is determined from a specimen which has been heated at least 20.degree. C. above its melting point and recrystallized from the melt at a cooling rate of 1.degree. C./min from 20.degree. C. above the melting point to about 250.degree. C. or below. Heat of fusion and melting point are determined by differential scanning calorimetry (DSC: ASTM D3418). "Melting point" refers to the temperature at the peak of the DSC melting endotherm.

Benefits:

- Superior in creep resistance to conventionally fabricated PTFE articles.

Applications:

- Can use hot compression molding to fabricated PTFE

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